COURSE OUTLINE

1. GENERAL

SCHOOL	SCHOOL OF APPLIED BIOLOGY AND BIOTECHNOLOGY		
DEPARTMENT	BIOTECHNOLOGY		
STUDY LEVEL	BACHEROL OF SCIENCE		
COURSE CODE	205	**SEMESTER**	8th (spring semester)
COURSE TITLE	PLANT BIOTECHNOLOGY		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**ECTS**
Lectures	3	1,56
Practical Lab Courses	2	0,56
Group class presentation (selected topics/ scientific articles)		1,48
Autonomous study (personal assignment)		2,40
TOTAL	SUM:	**6**

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Filed of Science
PREREQUISITES	-
LANGUAGE	Greek (Teaching & Exams)
IS THE COURSE OFFERED for ERASMUS STUDENTS?	YES (in English) (Teaching & Exams)
COURSE WEB PAGE	www.aua.gr/plantdevelopment

2. LEARNING OUTCOMES

Learning Outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

Upon successful completion of this course the students will acquire new knowledge and specific skills on the following subjects:

• Will gain knowledge on the major fields concerning the modification, transfer, expression and phenotypic appearance of the genetic information. The process of DNA transfer from any organism into plants.

• Creating new and novel traits in plants, or even features that are not found in plants.

• Using transgenic plants as bioreactors to produce substances with high added value.

• Creating transgenes in order to produce human proteins and vaccines.

• Using transgenics to provide service.

• Molecular agriculture and in production pluralism through plants, in general.

• Creation of transgenic plants as biofuels and remediation of polluted environments

• Will gain knowledge on genetic information transfer techniques and methods and on DNA analysis.

• Will have knowledge of procedures and practices of DNA and RNA analysis.

• Will have knowledge of the processes and methods for applications of molecular analysis

of transgenic plants.
• Will be capable to analyze, evaluate and decide on the applicability of techniques and methods for creating transgenic plants with molecular tools in any case scenario.
• Can work with fellow students to create and present a comprehensive study based on a given theoretical background, experimental procedure, results and discussion. This is done using / combining the data, processing the experimental laboratory exercises, and accessing to on-line libraries and journals.
• This study is given in PDF or DOC format and requires basic background knowledge of computer skills, using different programs as well as analysis by EXCEL.
• Can promote social awareness and Bioethics regarding the decisive contribution of several transgenic plants and use them for production and / or daily services, and the ability to develop new one.

General Competencies

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?
Search for, analysis and synthesis of data and information, with the use of the necessary technology
Adapting to new situations
Decision-making
Working independently
Team work
Working in an international environment
Working in an interdisciplinary environment Production of new research ideas
Project planning and management
Respect for differences and multiculturalism
Respect for the natural environment
Showing social, professional and ethical responsibility and sensitivity to gender issues
Criticism and self-criticism
Production of free, creative and inductive thinking

1) Retrieve, analyze and synthesize data and information relying on use of necessary technologies.
2) Adjust to new situations.
3) Decision making.
4) Work autonomously.
5) Work in groups.
6) Create novel scientific projects.
7) Design and develop research projects/experiments.
8) Be critical and self-critical.
9) Apply knowledge to practice.

3. COURSE CONTENT

1. Principles of Gene manipulation
2. Agrobacterium DNA transfer.
3. DNA vectors and transgenic plants
4. Tissue – Cell culture for DNA transfer.
5. Abiotic transformation methods – Electroporation.
6. Particle Bombardment and Gene-Biomolecules Transfer.
7. Chemical and mechanical gene transfer in plants.
8. Gene Targeting and Mutagenesis.
9. Regulation of gene expression in Plant Biotechnology
10. In vitro production of secondary metabolites
11. Mutations, selection and map based cloning

4. TEACHING and LEARNING METHODS

TEACHING METHOD *Face-to-face, Distance learning, etc*	Direct (face to face).
USE OF INFORMATICS and COMMUNICATION TECHNOLOGIES	Power point presentations, student contact electronically.

Use of ICT in teaching, laboratory education, communication with students	
TEACHING ORGANISATION *Lectures, Seminars, Laboratory Exercises, Field Exercise, Literature Study & Analysis, Tutorial, Internship, Clinical Exercise, Interactive Teaching, Educational Visits, Study Preparation (Project), Written assignments, Independent study* *The student's study hours for each learning activity are listed, so that the total workload at the semester level corresponds to ECTS standards.*	<table><tr><th>*Δραστηριότητα*</th><th>*Φόρτος Εργασίας Εξαμήνου*</th></tr><tr><td>Lectures</td><td>39 h</td></tr><tr><td>Practical Lab Courses</td><td>14 h</td></tr><tr><td>Group class presentations</td><td>37 h</td></tr><tr><td>Autonomous study</td><td>60 h</td></tr><tr><td>***Course total (25 hours of student work load per ECTS)***</td><td>***150 (6 ECTS)***</td></tr></table>
STUDENT EVALUATION *Evaluation Methods, Formative or Inferential, Multiple Choice Test, Short Answer Questions, Essay Development Questions, Problem Solving, Written Assignment, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Others* *Expressly specified assessment criteria are stated and whether and where they are accessible to students.*	**I)** Written final examination (35%) with ranking difficulty on the basis of the issues and subjects presented during theoretical courses. The exams will include: - Questions of multiple choice. - Questions of theoretical knowledge. - Theoretical problems to be resolved. **III)** Group and small autonomous assignments (15%) **II)** Laboratory exercises/ practical courses and group assignments (50%). Students individually or in groups will provide a written report before the beginning of the next exercise. The grade of lab courses will be based on the writing reports, attendance and class participation.

5. BIBLIOGRAPHY

-Προτεινόμενη Βιβλιογραφία :

1. Αρχές και Εφαρμογές στη Βιοτεχνολογία Φυτών, 2021, Πολυδεύκης Χατζόπουλος, Εκδόσεις ΕΜΒΡΥΟ, Αθήνα.

2. Genes VIII, Lewin, Ελληνική Μετάφραση, Ομάδα συγγραφέων, 2004, Εκδόσεις Μπάσδρα και ΣΙΑ ΟΕ. Αλεξανδρούπολη

3. Genetics, Ελληνική Μετάφραση, Ομάδα συγγραφέων, 2009, Εκδόσεις Μπάσδρα και ΣΙΑ ΟΕ. Αλεξανδρούπολη

4. Lewin's Βασικές αρχές Γονιδίων, 2022, Broken Hill Publishers Ltd, Κύπρος.-*Συναφή επιστημονικά περιοδικά:*

Plant Biotechnology, Journal of Biotechnology, Biotechnology Journal, Nature, Nature Biotechnology Science, Plant Molecular Biology, The Plant Cell, PNAS USA, Plant Journal, New Phytologist, Journal of Experimental Botany